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IS 3188 (1980): Characteristics of string insulator units
[ETD 6: Electrical Insulators and Accessories]

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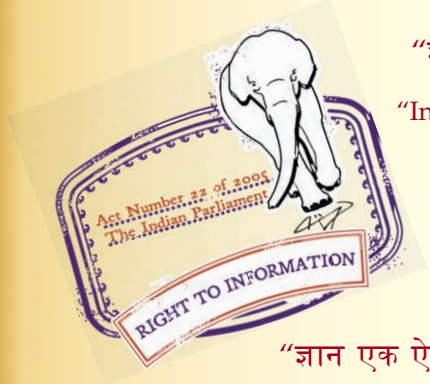

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IS : 3188 - 1980
(Reaffirmed 2004)

Indian Standard

CHARACTERISTICS OF STRING INSULATOR UNITS

(*First Revision*)

First Reprint JULY 1991

UDC 621·315·624·4

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

December 1980

Indian Standard

CHARACTERISTICS OF STRING INSULATOR UNITS

(First Revision)

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Indian Standard

CHARACTERISTICS OF STRING INSULATOR UNITS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 27 September 1980, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was first published in 1965 and was based on the practices followed in the country at that time. This revision has been undertaken with a view to bring the requirements of this standard in line with the International practices and also to take into account the technological advancement taking place in this field.

0.3 String insulator units are used singly or in the form of insulator strings consisting of a number of insulator units to serve the insulation needs of overhead power lines. The number of insulator units constituting the strings is dependent upon the voltage of the line. The object of this standard is to prescribe specified values for the mechanical characteristics and the principal dimensions of the string insulator units to ensure their interchangeability.

0.4 Electrical characteristics-power-frequency withstand voltages and impulse withstand voltages of a string insulator unit which depend mainly on its geometrical dimensions are not specified in this standard. They shall be as agreed to between the manufacturer and purchaser (*see also* IS : 731-1971*). The withstand voltages shall not be considered as determining the characteristics of insulator strings consisting of several units which shall also be agreed.

0.5 The puncture voltage of a string insulator unit is also a specified characteristic which exceeds the actual dry flashover voltage of the unit by a safety margin of 1.3.

*Specification for porcelain insulators for overhead power lines with a nominal voltage greater than 1 000 V (*second revision*).

0.6 In the preparation of this standard, assistance has been derived from the following publications, issued by the International Electrotechnical Commission:

IEC Publication 305(1974) Characteristics of string insulator units of the cap and pin type.

IEC Publication 383(1976) Tests on insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1 000 V.

IEC Publication 471(1977) Dimensions of clevis and tongue couplings of string insulator units.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard applies to string insulator units of the cap and pin type with porcelain insulating parts intended for ac overhead power lines with nominal voltage greater than 1 000 V and a frequency not greater than 100 Hz.

1.2 This standard applies to string insulator units of the cap and pin type with ball and socket couplings or clevis and tongue couplings.

1.3 This standard applies to string insulator units for use on overhead power lines situated in atmospheres with no significant pollution. It may be applied to insulators intended for polluted atmospheres, in which case it will be necessary to modify certain dimensions. In any case, it is recommended that the standardized mechanical characteristics of this standard should be followed in such cases also.

2. GENERAL INFORMATION

2.1 Definitions and Methods of Test — The definitions and methods of tests are given in IS : 731-1971†.

2.2 Couplings — Ball and socket, and tongue and clevis type of couplings used for the string insulator units are covered by the following Indian Standards:

IS : 2486 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V.

*Rules for rounding off numerical values (*revised*).

†Specification for porcelain insulators for overhead power lines with a nominal voltage greater than 1 000 V (*second revision*).

IS : 2486 (Part I)-1971 General requirements and tests (*first revision*)

IS : 2486 (Part II)-1974 Dimensional requirements (*first revision*)

IS : 2486 (Part III)-1974 Locking devices

3. MECHANICAL AND DIMENSIONAL CHARACTERISTICS

3.1 String insulator units are standardized by the following characteristics:

a) Electromechanical or mechanical failing load (*see* IS : 731-1971*),
b) Nominal diameter of the insulating part,
c) Nominal spacing,
d) Minimum creepage distance, and
e) Standard coupling.

3.2 The corresponding values of these characteristics are given in Tables 1 and 2.

TABLE 1 VALUES OF MECHANICAL AND DIMENSIONAL CHARACTERISTIC FOR STRING INSULATOR UNITS WITH BALL AND SOCKET COUPLING

(*Clauses* 3.2 *and* 3.3)

Type No.	Electromechanical or Mechanical Failing Load	Nominal Dia *d* of Insulating Part	Nominal Spacing *s*	Minimum Creepage Distance	Size of Pin Ball and Socket Coupling*
(1)	(2) kN	(3) mm	(4) mm	(5) mm	(6) mm
1 b	45	255	145	280	16
2 b	45	255	145	320	16
3 b	70	255	145	280	16
4 b	70	255	145	320	16
5 b	90	255	145	280	16
6 b	90	255	145	320	16
7 b	120	255	145	290	16
8 b	120	255	145	320	16
9 b	120	255	145	290	20
10 b	120	280	145	290	20
11 b	120	280	145	320	20
12 b	160	280	170	330	20

*The dimensions of pin ball and socket shall be according to Fig. 8 and 9 respectively of IS : 2486 (Part II)-1974 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V : Part II Dimensional requirements (*first revision*).

*Specification for porcelain insulators for overhead power lines with a nominal voltage greater than 1 000 V (*second revision*).

3.3 The insulators are designated in Table 1 by type numbers 1, 2, 3,... (*see* col 1), followed by a letter 'b' which denotes ball and socket coupling.

3.3.1 Figure 1 shows a typical string insulator unit with ball and socket coupling.

3.4 The insulators are designated in Table 2 by Type numbers 1, 2, 3, ... (*see* col 1), followed by a letter 'c' which denotes clevis and tongue coupling.

3.4.1 Figure 2 shows a typical string insulator unit with clevis and tongue coupling.

TABLE 2 VALUES OF MECHANICAL AND DIMENSIONAL CHARACTERISTICS FOR STRING INSULATOR UNITS WITH CLEVIS AND TONGUE COUPLING

(*Clauses* 3.2 *and* 3.4)

Type No.	Electromechanical or Mechanical Failing Load	Nominal Dia *d* of Insulating Part	Nominal Spacing *s*	Minimum Creepage Distance	Dimensions of Clevis and Tongue Coupling
(1)	(2)	(3)	(4)	(5)	(6)
	kN	mm	mm	mm	
1 c	45	255	145	280	*see* Note
2 c	45	255	145	320	*see* Note

Note — The dimensions of clevis and tongue coupling shall be according to Fig. 25 of IS : 2486 (Part II)-1974 Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 V : Part II Dimensional requirements (*first revision*).

4. MARKING

4.1 The marking shall be in accordance with 8 of IS : 731-1971*.

*Specification for porcelain insulators for overhead power lines with a nominal voltage greater than 1 000 V (*second revision*).

5. DIMENSIONS AND TOLERANCES

5.1 The string insulator unit shall be in accordance with the relevant drawings, particularly as regards any dimensions to which special tolerances apply (for example, spacing) and details affecting interchangeability (for example, ball and socket dimensions).

5.2 Unless otherwise specified, a tolerance of:

$\pm$ (0·04 d + 1·5) mm when d < 300 mm, and

$\pm$ (0·03 d + 6) mm when d > 300 mm

is allowed on all dimensions for which special tolerances do not apply (d being the dimension in millimetres).

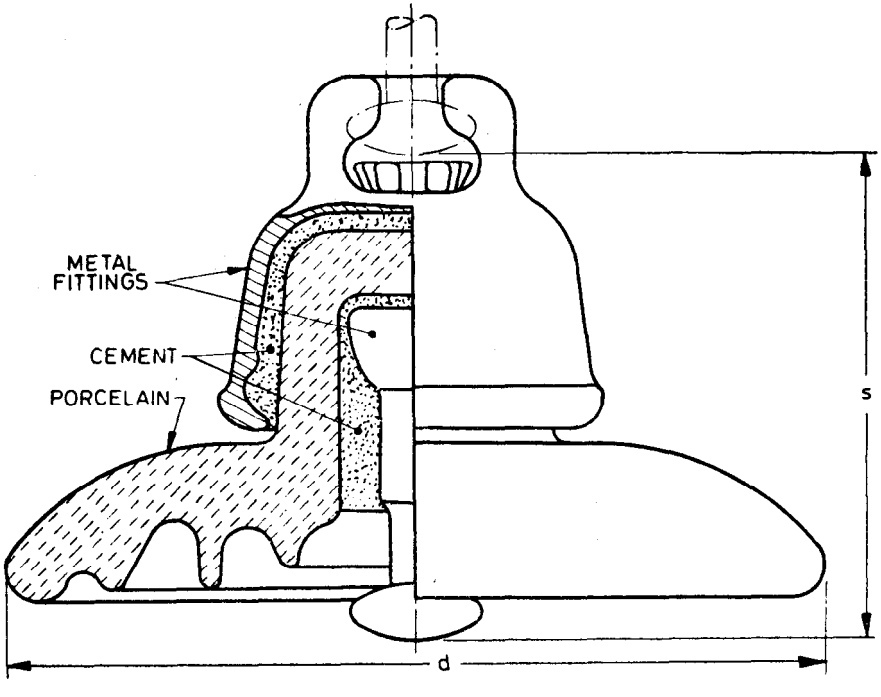

FIG. 1 BALL AND SOCKET TYPE

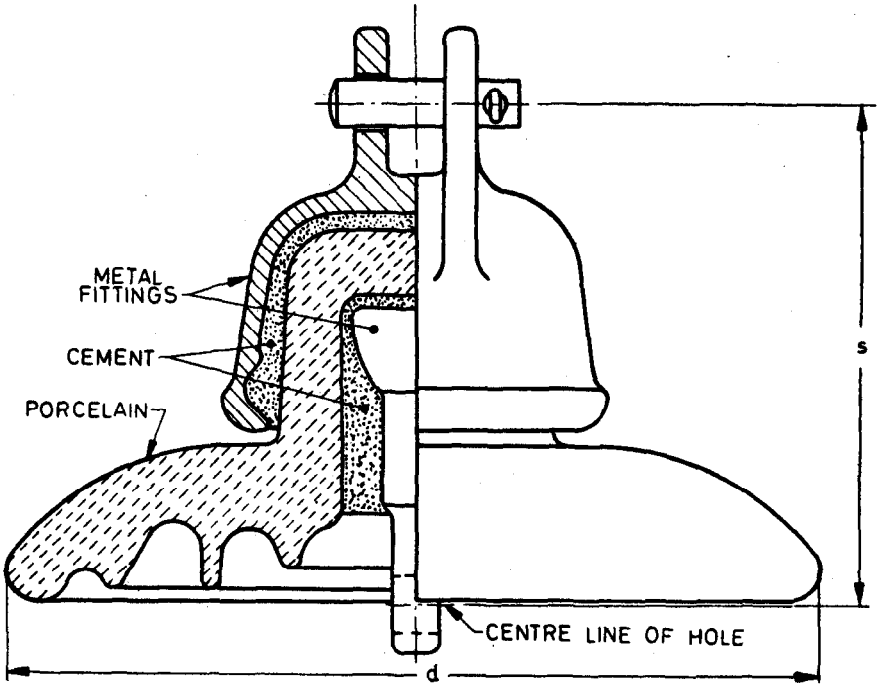

FIG. 2 CLEVIS AND TONGUE TYPE

5.3 Unless otherwise specified, a tolerance of $\pm$ (0·03 s + 0·3) mm is allowed on spacing, where s is the spacing in millimetres, of the string insulator unit.

5.4 Horizontal and Vertical Discharge Distances (d_h and d_v)

5.4.1 Wet flashover characteristics of insulator strings depend on certain special dimensions which are not specified in Table 1 and 2 and particularly the dimensions d_h and d_v (*see* Fig. 3) as well as the ratio $\frac{d_v}{d_h}$.

5.4.2 The requirements for d_h and d_v are under consideration.

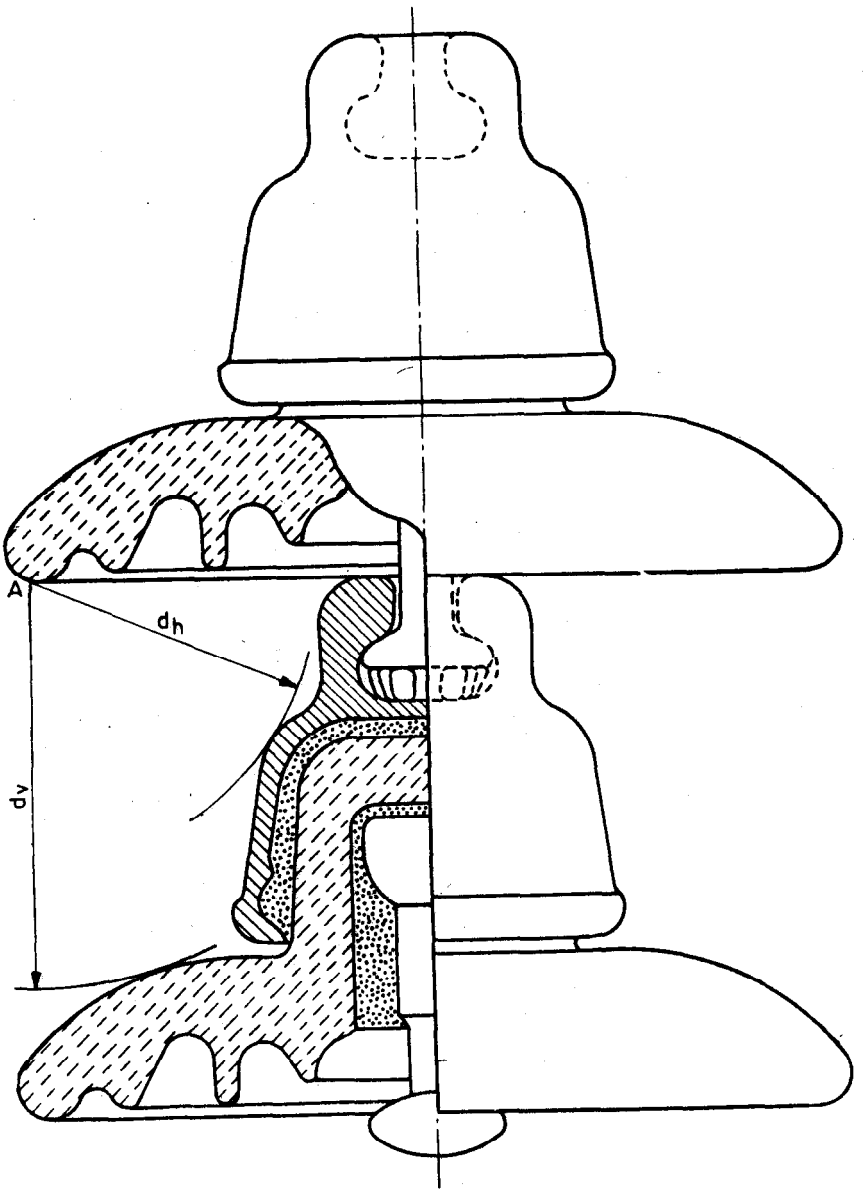

FIG. 3 HORIZONTAL AND VERTICAL DISCHARGE DISTANCES (d_h AND d_v)

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